

2

PROFESSIONAL PAPER 433 / March 1984

AD-A153 703

THE ALL VOLUNTEER FORCE: OUTLOOK FOR THE EIGHTIES AND NINETIES

Aline O. Quester
Robert F. Lockman

N00014-83-C-0725

DTIC FILE COPY

DTIC
ELECTE
MAY 14 1985
S D
E



CENTER FOR NAVAL ANALYSES

This document has been approved
for public release and sale; its
distribution is unlimited.

85 04 15.046

PROFESSIONAL PAPER 433 / March 1984

THE ALL VOLUNTEER FORCE: OUTLOOK FOR THE EIGHTIES AND NINETIES

Aline O. Quester
Robert F. Lockman

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification <i>form 50 per</i>	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
<i>A-1</i>	



Naval Planning and Management Department

CENTER FOR NAVAL ANALYSES

2000 North Beauregard Street, Alexandria, Virginia 22311

THE ALL-VOLUNTEER FORCE: OUTLOOK FOR THE 1980s AND 1990s

Despite public reluctance to return to conscription, concern about the future viability of the All-Volunteer Force (AVF) continues in Congress, the popular press, expert panels, and scholarly journals.¹ In the late 1970s, when the armed forces had problems recruiting nonprior-service males, even those philosophically inclined toward the AVF began to worry: The combination of a strong civilian economy, caps on military pay, cuts in G.I. Bill benefits, reductions in recruiting resources, and increases in federal civilian youth programs created recruiting shortfalls by 1979 for all services. The recruiting problems of the active forces were magnified in the reserves, where strengths fell dramatically.

The 1980s, however, have witnessed a different recruiting market. All branches of the active armed services are meeting or exceeding their recruitment goals, and recruit quality, at least as measured by entry test scores and high-school graduation, is increasing. Selected Reserve manning is near its all-time high, although the Individual Ready Reserve is still not at mobilization requirements.

While some concern about reserve manning is understandable, one might have thought that today's healthy recruiting environment would have alleviated fears about manning the active force with volunteers. But such is not the case. Concerns continue to be expressed about the future supply of young men, their quality, and how much it will cost to obtain them. We will address each of these issues in turn.

Decreases in the supply of young men (the birth-dearth and the subsequent youth-dearth) have been exhaustively analyzed.² Most of these analyses looked at future supply only in relation to current supply and demand. Here we look at the demands that the military has made upon the youth population in the past and what future demands might be. Next, we examine the quality of the armed forces, looking first at the entry test scores of recruits over the last 30 years. Additionally, we compare the test scores of current AVF recruits to those of the male youth population.

Finally, since keeping military pay competitive with civilian pay is a necessary condition for the viability of the AVF, we estimate how the wages of civilian youth can be expected to change as youth cohorts become smaller.

THE SUPPLY OF YOUNG MEN: PAST AND FUTURE

Our analysis concentrates on the 17- to 21-year-old male population, the main source of recruits for the armed forces. This age group peaked in 1978 when the number of young males was almost double that of 1960. The decline in this age group will continue until the

early 1990s. However, some forget that at the trough there will still be as many young males as there were in 1966. After 1993, the numbers will begin to grow again, because the sheer size of the postwar baby boom resulted in large numbers of women of child-bearing age in the 1970s. On average they had had fewer children than earlier generations, but there were more of them.

To understand the implications of this trend for the military, we must also take into account its fluctuating demand for young men. The relationship between supply and demand over the past two decades is depicted in figure 1, which shows the percentage of 17- to 21-year-old males who were in the military during that period.³ At the peak of the Vietnam War, 17 percent of the males in this age group--almost 1.6 million men--were in uniform. The percentage declined sharply as the war ended, and it continued to decline more gradually in the mid-1970s as the total pool of young men expanded. By the late 1970s, as this age group peaked, the percentage leveled off.

If the size of the military were to remain about the same as it is now over the next two decades, the youth-dearth now confronting us would not be a serious problem.⁴ The percentage of this age group that the military would require would still be far below the levels of the past 20 years, even those in the pre-Vietnam War era.

But what would happen if the international situation again required a substantially larger force--one comparable, for example, to the force we had in 1968 at the peak of the Vietnam War? How would the shrinkage of the total pool of young males affect our ability to man such a force, even if the draft were reinstated?

Figure 2 illustrates one way of looking at this requirement for a "surge" capacity from the perspective of both the past and the future. It shows what fraction of the country's young males would be, or would have been, in the armed forces at any given time between 1960 and 2000 if the military demanded as many of them as it did at the peak of the Vietnam War. Although a "surge" comparable to the Vietnam buildup would require enlisting proportionally more young men in the late 1980s and early 1990s than it did in 1968, it would have involved considerably greater proportions of male youth in the early 1960s.

QUALITY

In addition to sheer numbers, the military services are also concerned about the mental quality of their recruits. Two key questions arise here: What has been the impact of the move to an all-volunteer force on mental quality? What will happen to the mental quality of recruits as a result of the decline in the total pool of 17- to 21-year-old males over the next decade, especially if forces ever have to be expanded beyond their present levels?

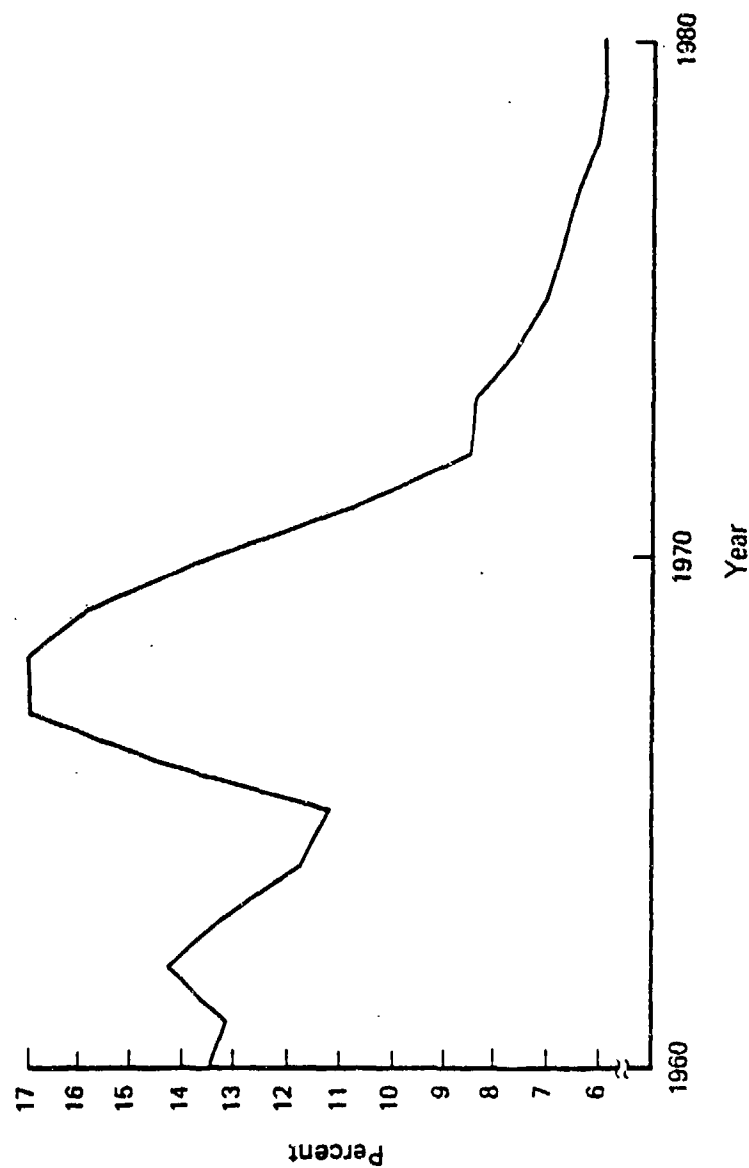


FIG. 1: PERCENT OF THE 17- TO 21-YEAR-OLD MALE POPULATION
IN THE MILITARY, 1960-1980

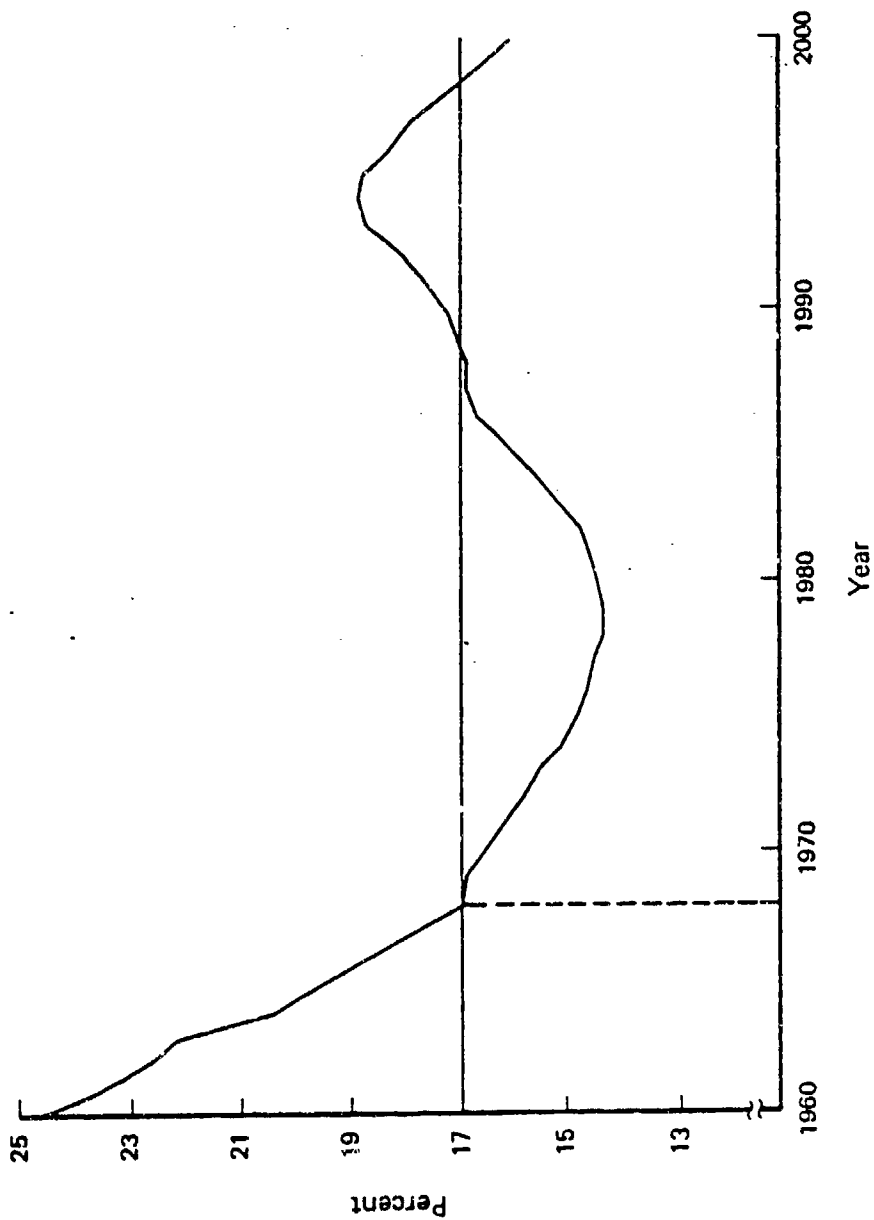


FIG. 2: SURGE CAPACITY*

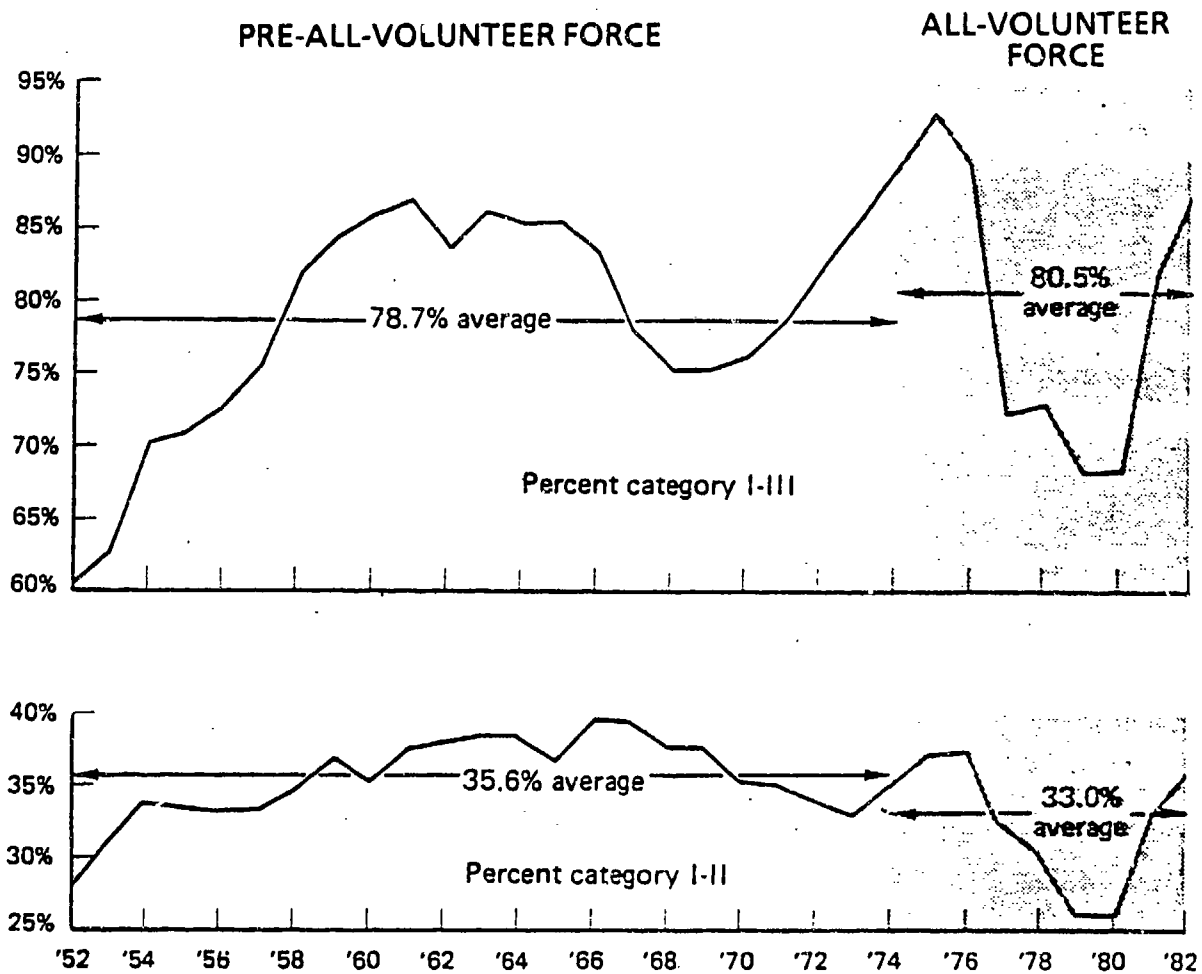
*In 1968, a peak 1.561 million 17- to 21-year-old males were in the military. The figure shows what percent of the 17- to 21-year-old male population would have been or would be required in other years to achieve this same force level.

One plausible measure of quality is the Armed Forces Qualification Test (AFQT). This test is administered to all recruits to measure their trainability. Figure 3 compares AFQT results for male nonprior-service (NPS) accessions since 1952.⁵ The upper portion shows the percentage of NPS male recruits who were in AFQT categories I through III, which encompass the top 69 percent of the male youth ability distribution. There have been wide variations in this percentage over the years, but the averages for the years before and during the AVF are not very different. From 1952 to 1973, 78.7 percent of recruits were in AFQT categories I through III. Since the advent of the AVF, 80.5 percent have been in these categories.

The lower portion of figure 3 shows a substantial variation in the percentage of recruits in AFQT categories I and II, the top 30 percent of the ability distribution. Again, there have been variations in this percentage over the years, but the averages for the years before and during the AVF are not very different. In short, from this time-series look at recruits by AFQT categories, it is difficult to find any differences between the average quality of military recruits before and after 1974.

Still AFQT scores dropped sharply from 1976 to 1980. Since the misnorming of the AFQT from 1976 to 1980 is at least partially responsible for this drop in scores, a brief discussion of the incorrect calibration is warranted.⁶ In January 1976, the first Armed Services Vocational Aptitude Battery (ASVAB) was implemented for DoD-wide use in recruit selection and classification, replacing individual service batteries (including previous AFQT versions⁷). The AFQT part of the new ASVAB was normed against the AFQT portion of the service batteries, but by April 1976 excessive numbers of recruits--compared to previous experience--were scoring in the above-average AFQT categories I and II. Although an adjustment was made to the AFQT norm to rectify the problem, the Center for Naval Analyses (CNA) reported in April 1978 that more Marine Corps recruits in below-average AFQT categories IV and V had been enlisted than were previously reported.

Because of the overall implications of misnorming for the quality of military manpower, the Office of the Secretary of Defense asked the Army Research Institute (ARI) to conduct a new norming study using applicants for all services, rather than recruits who had already been selected. Simultaneously, DoD commissioned the Educational Testing Service (ETS) to do a similar study using high school juniors and seniors. The ARI and ETS studies were completed in June 1980, along with a CNA reanalysis of Marine Corps recruit data. To review the results of these analyses, DoD retained the services of three nationally known testing experts. They concluded that (1) the norms in use were indeed inflating the AFQT scores of below-average recruits, and (2) that the ARI study provided the most appropriate basis for correcting the problem. In October 1980, a correct norm for the ASVAB/AFQT was implemented, calibrated to the traditional World War II mobilization reference population.



Source: Data for 1952-75 are from Office of Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics). Data for 1976-81 provided by Defense Manpower Data Center. Data for 1982 are for the first three quarters only. Data for 1976-80 have been renormed.

FIG. 3: PERCENT OF MALE NONPRIOR-SERVICE ACCESSIONS
IN UPPER AFQT CATEGORIES

The data in figure 3 reflect the correctly calibrated scores; they do not reflect the quality the services perceived they were recruiting in the late 1970s. For example, in 1979 the Army thought only 10 percent of their recruits were in AFQT category IV; actually over 45 percent of their recruits were in that category.⁸

In early 1981, the new form of the ASVAB was administered by the National Opinion Research Center to a representative sample of the nation's youth selected by the Department of Labor.⁹ The results enable us to compare today's military recruits with today's youth in general and both groups with the World War II mobilization reference population. Table 1 contains AFQT results for all DoD recruits in FY 1983, a representative sample of the 1980 male youth population, and the World War II mobilization reference population of December 1944. Not only do today's male youth have a higher median score than males (officer and enlisted) in the reference population, but a greater percentage of today's military recruits come from mental categories I through III than do today's civilian youth.

TABLE 1
POPULATION COMPARISONS ON ARMED FORCES QUALIFICATION TEST (AFQT)

AFQT category	Percent of population in each category		
	World War II mobilization ^a	FY 1983 DoD male accessions	1980 male youth ^b
Category I	8	4	5
Category II	28	37	35
Category III	34	50	29
Category IV	21	8	23
Category V	9	0	8
Category I-III	70	92	69
Median AFQT score			
	50	66	53

a. The World War II mobilization reference population approximates the actual composition of males on active duty (officers and enlisted personnel) as of 31 December 1944.

b. The 1980 male youth population is restricted to persons born between 1 January 1957 and 31 December 1962 (18 through 23 years old at time of testing, July-October 1980). The 1980 male youth data is a national representative sample of approximately 6,000 individuals.

When recruit quality is measured by the probability that a recruit will complete the first enlistment term, high-school graduates are found to be better quality recruits than nonhigh-school graduates. High-school graduation, in fact, is the most important predictor of adaptability to military service, and the AVF has been successful in recruiting graduates. From FY 1964 to 1973, an average of 71 percent of total active-duty, nonprior service recruits were high-school graduates. In the AVF years, from FY 1973 to 1982, the average has been 72 percent.

What would happen to recruit quality, however, if we require force levels that involve larger proportions of the youth population? Figure 4 illustrates the historical relationship between accession AFQT scores and youth military participation. Over the entire 23-year period, at least 70 percent of DoD accessions were in mental categories I through III with two exceptions. In 1979 and 1980, the percentage slipped to 69 after corrections for AFQT misnorming were made.¹⁰

Under conscription, the military can require minimum AFQT standards that will be met if the youth population is big enough. Since 70 percent of the youth population falls in AFQT categories I through III, the military theoretically could procure 100 percent category I through III recruits as long as it demands less than 70 percent of the youth population. (Actually the supply is less than 70 percent: 10 to 15 percent of youth applicants cannot pass military physicals, and there are deferments and exemptions.¹¹)

Under a voluntary procurement system, there is, of course, an additional constraint. Not only must there be sufficient numbers of able youth, but also they must be willing to enlist. Societal attitudes toward military service as well as economic variables like pay and unemployment come into play.

In a "surge" environment, the procurement process would probably be involuntary. Since we do not expect the percentage of youths in the different mental categories to change, 1968 probably provided the severest test of potential future quality difficulties. Then, as figure 4 shows, the fraction of 17 to 21 year olds that were recruits peaked at 17 percent, and about 75 percent of them were in mental categories I through III. Since the number of recruits in 1968 translates into larger proportions of the smaller youth population in the late 1980s and early 1990s, there is some reason for concern about "surge" force quality.

If the military ever needs as many recruits in the late 1980s and 1990s as it had in 1968--and if it wants them to be youthful--it will probably have to be satisfied with only about 69 percent of them being in mental categories I through III (the percentage found in the total 1980 male youth population shown in table 1). Because of the increasing

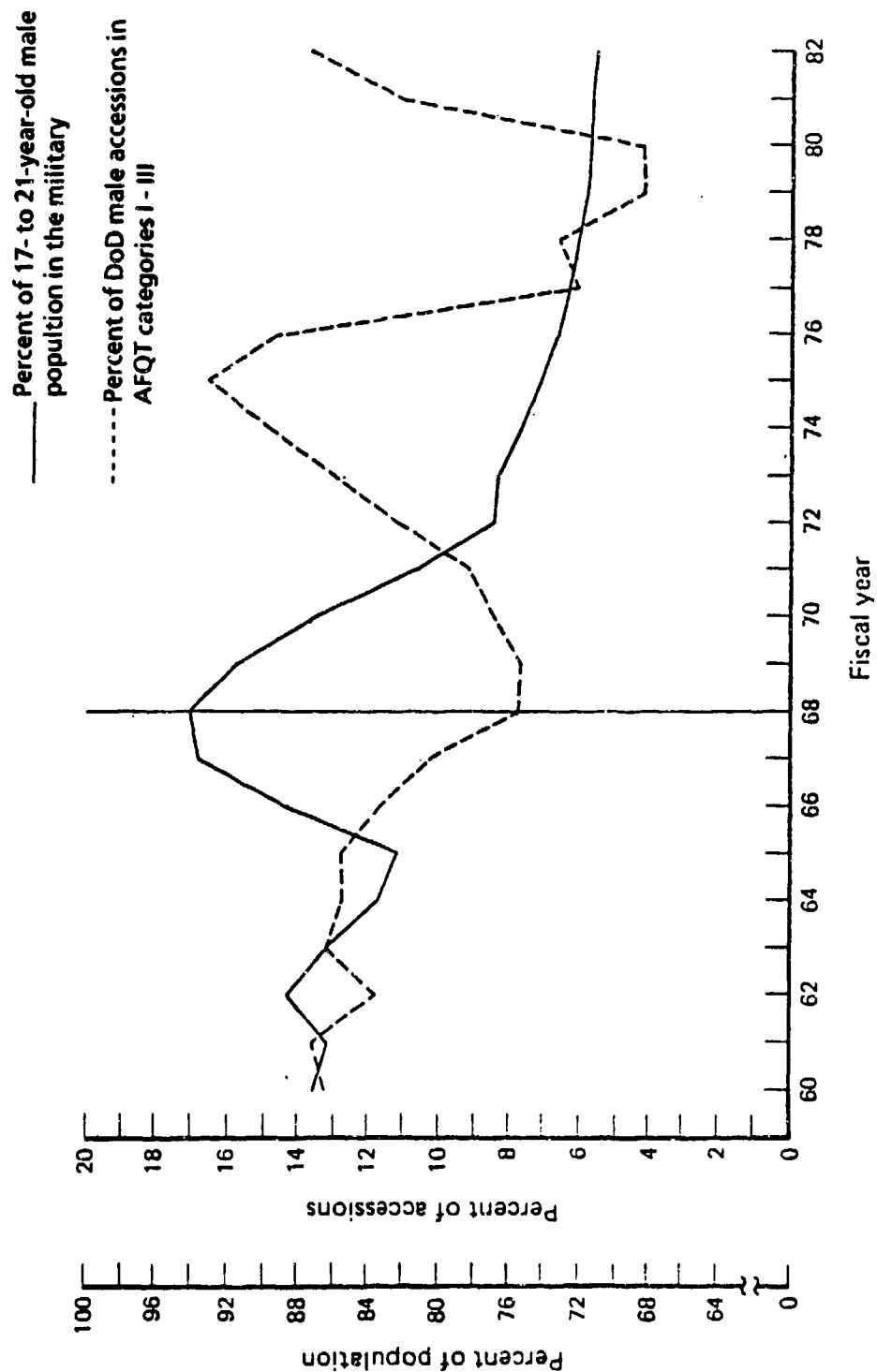


FIG. 4: ACCESSION QUALITY AND MALE YOUTH
MILITARY PARTICIPATION, FY 1960-1982

complexity of many military jobs, such a reduction in the numbers of able young men might be a problem.

Returning to a peacetime military, however, the 1982-1983 recruiting market was the strongest the AVF has known: Over 80 percent of DoD male nonprior-service accessions were AFQT categories I-III and were high-school graduates. Given that the AVF has maintained recruit quality in a peacetime military, how representative are its recruits of the overall male youth population?

REPRESENTATIVENESS

Concerns about the representativeness of today's young male recruits differ from concerns about the mental quality of accessions. For representativeness, a cross section of the diverse U.S. population is desired. Most discussions of representativeness focus on race or social class, but region, ethnic origin, and religious preference could also be considered.¹²

Advocates of representativeness argue that it prevents dominance of the military by any one group and more fairly distributes the burden of military service--important in a democratic society as well as for America's image in the eyes of other nations. Their concern with fairness is frequently linked to the concept of military service as a duty of citizenship. Others, like ourselves, are less concerned with representativeness as such and more concerned with individual freedom of choice. Rarely do advocates of these two viewpoints find common ground in their arguments. Moreover, without consensus on objective criteria for representativeness, they are likely to disagree in their evaluations.¹³

Available historical information on the socioeconomic backgrounds of individuals in the military suggests that the military has traditionally drawn, and continues to draw, heavily from the lower middle class.¹⁴ This is not surprising, because the military provides essentially free training (much of it transferable to the civilian sector), status, and stable employment.

What about racial representativeness? Here the primary concern is with the disproportional representation of blacks in the military. While male blacks are nearly 14 percent of the youth population, they were 19 percent of FY 1982 DoD recruits. The Army, with 25 percent, had the largest proportion.¹⁵

Reasons that the military is more attractive to black Americans are not difficult to uncover.¹⁶ One is the high unemployment rate among blacks. Also, the civilian sector has racial earnings differentials; the military does not.

To the extent that differences in opportunities in the military and civilian sectors account for the differential attraction of military service, the racial composition of the military will become more representative of the general populace as civilian opportunities improve for blacks. Blacks' earnings, particularly those of young blacks, have increased substantially relative to whites' earnings since World War II. After fairly sluggish growth until the mid-1960s, the ratio grew substantially in remainder of the 1960s and the 1970s.¹⁷ If it continues to grow, the over-representation of blacks should decline in the 1980s and 1990s.

COHORT-INDUCED WAGE CHANGES

Most analyses of the future recruiting environment suggest that recruitment success depends upon military wages keeping pace with civilian wages.¹⁸ Force planners looking ahead to the next two decades need to know how civilian wages can be expected to behave. To compete with colleges and universities as well as with private sector employers, what wage levels will the military have to pay?

Before attempting to answer this question, it is worthwhile to review how changing age distributions might change earnings distributions. If workers in all experience categories substituted perfectly for one another, changes in the age distribution of the population would not change the earnings distribution: The returns for a worker's labor would be unrelated to the numbers in his experience category. Although we know little about the parameters that determine the substitution possibilities among workers of different experience levels, we do know that substitution possibilities are not perfect: Changes in the proportion of young (inexperienced) workers to older (experienced) workers change relative wage rates.

In fact, the wage changes that resulted from the baby boom's entry into the job market have been carefully researched.¹⁹ Empirical estimates of the pure effect of a cohort's size on its earnings have been calculated, and the largest effects have been found for entry-level workers. This result is intuitively appealing. Differences in cohort sizes make greater differences when workers are young; as they age, their labor substitutes more easily for a broader range of age groups. As individuals age, the importance of the size of their birth cohort in predicting their earnings diminishes substantially.

Our estimates of how real wages of 17- to 21-year-old males can be expected to change are found in table 2. The peak comes in 1995, when we project increases of 10 to 12 percent over 1982 levels.

These estimates are for military participation levels that correspond to the average of the 1967-1975 period. If we want to procure larger numbers of recruits or achieve wage equity under a wartime draft, larger pay increases would be needed. Such estimates, however, involve

considerable uncertainty. In World War II, for example, we achieved a type of "wage-equity" by freezing civilian wages.

Whether the changes portrayed in table 2 are large or small depends upon one's perspective. They are, in fact, not so different in magnitude from the baby-boom cohort-induced wage reductions in the 1967-1975 period, estimated to be about 8 percent.

TABLE 2
ESTIMATED CHANGE IN THE WAGES OF 17- TO 21-YEAR-OLD MALES
(Relative to 1982)

	<u>Number</u>	<u>Percent change in:</u>	
		<u>Population share</u>	<u>Real wages</u>
1985	9.6M	-10	3 to 4
1990	9.0M	-18	6 to 8
1995	8.3M	-31	10 to 12
2000	9.6M	-20	7 to 8

SOURCE: See note 20.

SUMMARY AND CONCLUSIONS

We have analyzed the supply of first-term military manpower from 1960 to 2000. First, we documented changes in the size of the male youth cohort over the next two decades. While the future promises smaller numbers of young men than are currently available, these reduced cohorts are not unprecedented.) In the 1960s, which had smaller youth populations than we expect in the 1980s and 1990s, we manned a large, young armed force. We did not man it exclusively with volunteers, however. Although we have historical experience with small youth cohorts and large youthful forces, we have no experience with them in a volunteer environment.

We tried to evaluate the quality and representativeness of the AVF, and we measured quality using the AFQT scores and high-school graduation status of military recruits. Although we found some sharp year-to-year variations in recruit quality, we found no significant differences in a force manned exclusively versus partially by volunteers. Overall, we found no convincing evidence that the quality of today's recruits is inadequate, although not maintaining military pay at a level comparable

to civilian wages could change that situation.²¹ We submit, in fact, that the relationships among individual characteristics, military unit characteristics, and productivity are the most poorly understood area in military manpower research. As the military buys increasingly complex equipment, the need for more research on the relationship between manpower quality and force readiness becomes even more urgent.

Representativeness is a more difficult problem. While it might appear that a representative military can be produced straightforwardly by conscription, the United States has not been that successful in practice. Similarly, while it appears difficult to produce a representative military by volunteerism, in practice the results may not be so different from the representativeness achieved under conscription. Although the AVF is currently characterized by disproportionate representation of blacks, we expect this to change if blacks' earnings continue to improve relative to whites' earnings.

Finally, we turned to the future costs of the AVF, estimating how smaller youth cohorts will change youth wages. Drawing on established research to develop projections of these wage changes, we find, not surprisingly, that the relative wages of youth can be expected to rise. Moreover, we can roughly benchmark civilian youth wage changes to the size of the military and estimate the cost of wage equity for different force levels. Since military pay raises in the early 1980s were critical in turning the recruitment market around, and since even under conscription there would be strong pressure to achieve wage equity, knowledge of future civilian youth wages is important. We estimate increases, but probably smaller increases than some had expected. To keep pace, we estimate the military will need to pay 10 to 12 percent more than its current real wage levels by 1995.²²

Not surprisingly, the opportunity cost of utilizing young men rises when there are fewer of them. However, changes in real resource costs are independent of an AVF-draft debate. No matter how we obtain first-term personnel in the future, the cost in reduced civilian output will be somewhat greater than it is today.

In summary, considering military demands for youthful males along with their quality, representativeness, and costs, the outlook for the AVF in the 1980s and 1990s is encouraging.

NOTES

1. See testimony by Sen. Ernest F. Hollings (D-SC) on the shortcomings of the AVF in hearings on DoD authorization for appropriations for FY 1983, Part 3: Manpower and Personnel (February-March 1982); The Military Draft, edited by Jason Berger, The Reference Shelf, volume 53, number 4 (NY: The H.W. Wilson Co., 1981); General Brent Scowcroft (editor), Military Service in the United States, The American Assembly, Columbia University (Englewood Cliffs, N.J.: Prentice-Hall, 1981); Lowndes F. Stephens, "Retaining Citizen Soldiers," Armed Forces and Society 3 (Spring 1982): 471T486; and Conscripts and Volunteers, edited by Robert K. Fullinwider (Totowa, NJ: Rowman & Allanheld, 1983).
2. For the basic data, see United States Bureau of the Census, Current Population Reports, Series P-2S. Report numbers 519, 704, 721, and 870 contain population estimates by age, sex, and race. For analyses see James R. Hosek, Richard L. Fernandez, and David W. Grissmer, "Active Enlisted Supply: Prospects and Policy Options" (Santa Monica, California: The Rand Corporation, March 1984): P-6967; Michael L. Wachter, "Intermediate Swings in Labor Force Participation," Brookings Papers on Economic Activity 2 (Washington, D.C.: Brookings Institution, 1977): 545-574; and Finis R. Welch, "Effect of Cohort Size on Earnings: The Baby Boom Babies' Financial Bust," Journal of Political Economy 87, (October 1979): 565-598.
3. Data are from United States Bureau of the Census. The citations are reported in note 2.
4. James R. Hosek, Richard L. Fernandez, and David W. Grissmer, "Active Enlisted Supply: Prospects and Policy Options," (Santa Monica, California: The Rand Corporation, March 1984): P-6967; and Robert F. Lockman and CDR. L.E. Curran, USN, "The Missing Link in Recruit Attainability Projections," (Alexandria, V.A.: Center for Naval Analyses, April 1984): CRM 84-2.
5. Data are from Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), Profile of American Youth (Washington, D.C.: Department of Defense, March 1982): 69.
6. Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), "Aptitude Testing of Recruits," a report to the House Committee on Armed Services (Washington, D.C.: Department of Defense, July 1980).
7. See Profile of American Youth and J.E. Uhlener, "Development of Armed Forces Qualification Test and Predecessor Army Screening Tests, 1946-1950," (Washington, D.C.: Department of the Army, Adjutant General's Office, 7 November 1952): 23, PRB Report 976.

NOTES (Continued)

8. See David R. Segal, "Military Organization and Personnel Accession. What changed with the AVF...and What Didn't," in Conscripts and Volunteers, edited by Robert K. Fullinwider (Totowa, N.J.: Rowman and Allanheld, 1983): 10.
9. Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), "Profile of American Youth," 1980 Nationwide Administration of the Armed Services Vocational Aptitude Battery (Washington, D.C.: Department of Defense, March 1982): 15-23.
10. The product-moment correlation between "percent of 17- to 21-year-old male population in the military" and "percent of DoD accessions in mental categories I-III" for the 23-year period from 1960 through 1982 is essentially zero (.03). However, it is driven to zero by the positive relationship of the two variables during the 5-year period from 1976 through 1980 when the AFQT was incorrectly normed. As suggested earlier, the military then believed that it was getting higher quality recruits than actually was the case. If we omit these 5 years from the data, the correlation is negative (-.61).
11. See Kenneth J. Coffey, "If the Draft is Restored: Uncertainties, Not Solutions," in Conscripts and Volunteers, edited by Robert J. Fullinwider (Totowa, N.J.: Rowman and Allanheld, 1983) for a thoughtful discussion of this point.
12. J. Eric Fredland and Roger D. Little, "Socioeconomic Characteristics of the All-Volunteer Force: Evidence from the National Longitudinal Survey, 1979," report prepared for the Office of Naval Research (Annapolis, Maryland.: U.S. Naval Academy, February 1982).
13. For an earlier and more pessimistic assessment of the AVF, see Morris Janowitz and Charles C. Moskos, Jr., "Five Years of the All-Volunteer Force: 1973-78," Armed Forces and Society 5, 2 (Winter 1979): 171-218.
14. For a discussion of socioeconomic class in the military during conscription, see James W. Davis, Jr., and Kenneth M. Dolbeare, Little Groups of Neighbors: The Selective Service System (Waco, Texas: Markham, 1968); and J. Eric Fredland and Roger D. Little, Armed Forces and Society (forthcoming); and Coffey, op. cit.
15. For a discussion of the historical representation of blacks in the military, see Martin Binkin and Mark J. Eitelberg with Alvin J. Schexnider and Marvin M. Smith, Blacks and the Military (Washington, D.C.: Brookings Institution, 1982); and Charles C. Moskos, John Sibley Buter, Alan Ned Sabrosky, and Alvin J. Schnexnider, "Symposium: Race and the U.S. Military," Armed Forces and Society 6, 4 (Summer 1980): 586-613.

NOTES (Continued)

16. See John D. Blair, Richard C. Thompson, and David R. Segal, "Race and Job Satisfaction in the U.S. Army," in Changing Military Manpower Realities, edited by James Brown, Michael J. Collins, and Franklin D. Margiotta (Boulder, Colorado: Wertheim Press, 1983); and Melanie Martindal and Dudley L. Poston, Jr., "Variations in Veteran/Nonveteran Earnings Patterns Among World War II, Korea, and Vietnam War Cohorts," Armed Forces and Society 5 (1979): 219-43.

17. See James P. Smith and Finis R. Welch, "Black-White Male Wage Ratios: 1960-1970," American Economic Review 67 (June 1977): 323-338; and Smith and Welch, "Race Differences in Earnings: A Survey and New Evidence," (Santa Monica, California: The Rand Corporation, March 1978): R-2295-NSF.

18. For example, see Lawrence Goldberg, "Enlisted Supply: Past, Present, and Future," (Alexandria, Virginia: Center for Naval Analyses, October 1982): CNS 1168.

19. See Michael L. Wachter, "Intermediate Swings in Labor Force Participation," Brookings Papers on Economic Activity 2 (Washington, D.C., Brookings Institution, 1977): 545-574; and Finis R. Welch, "Effect of Cohort Size on Earnings: The Baby Boom Babies' Financial Bust," Journal of Political Economy 87 (October, 1979): 565-598.

20. Aline O. Quester and Robert F. Lockman, "The Market for Military Recruits," (Alexandria, Virginia: Center for Naval Analyses, 24 September 1982): (CNA) 82-1137.

21. We acknowledge, however, that our quality comparisons are based on the pre-AVF force, knowing that direct measures of military effectiveness are lacking.

22. A potentially more serious problem for military manpower procurement in the next two decades is the projected shortage of skilled technicians. It will be especially acute in the Air Force and Navy, where requirements for highly skilled technicians are rising sharply. Since skilled technicians are not first-term personnel, however, projected future retention difficulties are not part of the AVF debate.

CNA PROFESSIONAL PAPER INDEX1

PP 4072

Laird, Robbin F. *The French Strategic Dilemma*, 22 pp., Nov 1984

PP 415

Mizrahi, Maurice M. *Can Authoritative Studies Be Trusted?* 2 pp., Jun 1984

PP 416

Jondrow, James M., and Levy, Robert A. *The Displacement of Local Spending for Pollution Control by Federal Construction Grants*, 6 pp., Jun 1984 (Reprinted from *American Economic Review*, May 1984)

PP 418

Reslock, Patricia A. *The Care and Feeding of Magnetic Tapes*, 7 pp., Jul 1984

PP 422

Quester, Aline, and Marcus, Alan. *An Evaluation of The Effectiveness of Classroom and On the Job Training*, 35 pp., Dec 1984. (Presented at the NATO Defense Research Group Conference, Brussels, Jan 1985)

PP 423

Dismukes, N. Bradford, and Weiss, Kenneth G. *MARE MOSSO: The Mediterranean Theater*, 26 pp., Nov 1984. (Presented at the Seapower Conference, Washington, D.C., 26-27 November 1984)

PP 425

Horowitz, Stanely A., and Angier, Bruce N. *Costs and Benefits of Training and Experience*, 18 pp., Jan 1985. (Presented at the Symposium on Training Effectiveness, NATO Defense Research Group, Brussels, 7-9 January 1985)

PP 427

Cavalluzzo, Linda C. *OpTempo and Training Effectiveness*, 19 pp., Dec 1984. (Presented at the NATO Defense Research Group Conference, Brussels, Jan 1985).

PP 431

McConnell, James M. *A Possible Change in Soviet Views on the Prospects for Anti-Submarine Warfare*, 19 pp., Jan 1985

PP 433

Quester, Aline O. and Lockman, Robert F. *The All Volunteer Force: Outlook for the Eighties and Nineties*, 20 pp., Mar 1984. (To be published in *Armed Forces and Society*, 1985)

1. CNA Professional Papers with an AD number may be obtained from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22151. Other papers are available from the Management Information Office, Center for Naval Analyses, 2000 North Beauregard Street, Alexandria, Virginia 22311. An index of selected publications is also available on request. The index includes a listing of professional papers, with abstracts, issued from 1969 to December 1983).

2. Listings for Professional Papers issued prior to PP 407 can be found in *Index of Selected Publications (through December 1983)*, March 1984.